

11. Physical Examination--Heart Sounds

failure, MR.

I. Heart Sounds

- S1, S2, S3, S4
- Summation Gallop (when S3 and S4 coincide and augment each other)
- Systolic Sounds (clicks)
- Opening Snaps (OS) and Tumor Plops
- Pericardial Knock (PK)

II. S1

- 2 main components: M1 (mitral valve closure) and T1 (tricuspid valve closure)
MV usually closes slightly before TV. TV closure is softer. Splitting best heard at LLSB or at the apex.
- Wide splitting of S1:
 - Ebstein's Anomaly of the TV
 - RBBB
- No splitting of S1 heard in LBBB
- Single S1 occurs in SVT not associated with aberrant conduction
- Split S1 with ventricular arrhythmias
- Loud S1: short PR (0.08-0.12 secs),
 - premature beats/tachycardia, MS, TS,
 - atrial myxoma, left-to-right shunts,
 - exercise, fevere, anemia, hyperthyroid,
 - epinephrine, anxiety, pregnancy, A-V fistula, child (with a thin chest wall)
- Soft S1: long PR (≥ 0.20 secs), MR, TR,
 - severe AI, HTN, shock, CHF, MI,
 - myocarditis, myxedema, beta blocker
 - infusion, thick chest, emphysema,
 - pericardial effusion

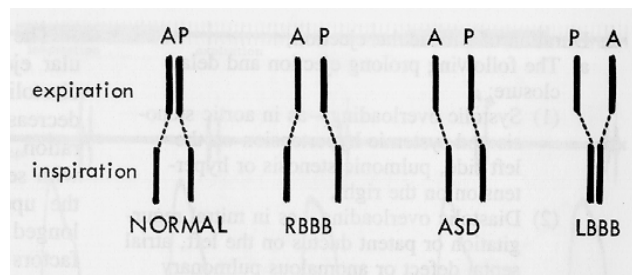
III. S2

- Corresponds to aortic (A2) and pulmonic (P2) valve closure
- Best heard in 3rd left ICS
- Decreased S2: emphysema, CHF, MI, pericardial effusion, PE, Shock, AS, PS
- Increased S2: Early stages of AS or PS.
- Increased A2: AI, aneurysm of the ascending aorta, systemic HTN
- Increased P2: Pulmonary HTN, normal children/young adults
- Fixed Splitting: ASD, VSD, anomalous pulmonary venous return, PS, MS high (PVR), MR with RV failure, RBBB or LBBB with RV failure, idiopathic dilation of the pulmonary artery, cardiomyopathy.
- Persistent Splitting: RBBB, LV rhythms, PS, pulmonary HTN, ASD, anomalous pulmonary venous, PI, VSD, RV

F. Paradoxical Splitting: LBBB, WPW-B), RV

AS, HTN, patent ductus, AI, LV failure, angina, MI, myocarditis, cardiomyopathy, TR.

- Persistent vs. fixed vs. paradoxical splitting (RBBB vs. ASD vs. LBBB):



IV. S3

- Normal (in children, and young adults--ie. < 40 y.o.) vs. Abnormal (protodiastolic or S3 gallop).
- Occurs in early diastole when the ventricular pressure falls below the atrial pressure. As ventricular filling is almost completed, there is a sudden deceleration of blood, and S3 is created.
- The low-pitched sound is best heard with the bell at the apex in the left lateral decubitus position.
- S3 occurs 0.14-0.22 secs (avg. 0.15sec) after the beginning of S2

V. S4: Related to atrial contraction.

Absent in Afib.

VI. Other

- Ejection Click: corresponds to the "snappy" opening of an abnormal semilunar valve or to the sudden distention of a dilated great artery."
- Mid-late systolic click of MVP/maneuvers for click/murmur
- Opening Snap (OS): high pitched and best heard with diaphragm
- Tumor Plop: same timing as OS.

